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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/597,780	06/20/2000	Alessandro Cesare Callegari	YOR-9-2000-0010	6159

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EXAMINER	
NGUYEN, HOAN C	
ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 03/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/597,780	CALLEGARI ET AL.	
	Examiner	Art Unit	
	HOAN C. NGUYEN	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 June 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the all features in claims 9 and 31 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

1. The disclosure is objected to because of the following reasons:

- Specification provides the device described in Fig. 11a that may not be operable as a multi-domain LCD (page 22 line 25 to page 23 line 17) because the comb-like common electrodes 84 and the comb-like pixel electrodes 85 electrically connected with a conductive layer 82. Therefore, the common electrodes and the pixel electrode have the same electrical potential, and could not rotate the liquid crystal molecules to generate the multi-domain.
- Specification fails to provide an essential method of forming "a combination" of hydrogenated diamond-like carbon, amorphous

hydrogenated silicon, silicon carbide, silicon dioxide, glass, silicon nitride, alumina, cerium oxide, tin oxide, zinc titanate as claim 3 disclosed.

- Specification fails to provide an essential method of forming "dry deposisted liquid crystal alignment layer" in claims 9, 31

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. An infinitive language "repeating the steps as needed" is used in this claim. Applicant needs to specify which step needs to repeat as needed or condition for steps to repeat. If there is no need to repeat, this claim becomes unnecessary and will be failed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samant et al. (US6061115A) in view of Callegari et al. (US6020946A).

Samant et al. (col. 3 line 45 to col. 5 lines 26) teach a method of preparing a multi-domain is selected from the group consisting of mechanical mask, photo-resist, UV treatment and a ridge and fringe field (col. 2, lines 10-15); wherein the mechanical mask method comprises:

- depositing on a transparent conducting layer on substrate a material to form a dry deposited;
- masking the dry deposited into first domain areas and second domain areas of the dry deposited layer with mask;
- selectively bombarding the dry deposited layer with an ion beam through the mask;

wherein the dry deposited material is selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide, silicon dioxide, glass, silicon nitride, alumina, cerium oxide, tin oxide, zinc titanate.

However, Samant et al. fail to disclose a transparent conductive layer on a substrate.

In a conventional prior art, the alignment layer is formed on the transparent conductive electrode, which is formed on the substrate. Therefore, although Samant et al. provide a method of preparing a multi-domain with the alignment layer produced on the surface of substrate, it is obvious to include also the transparent conductive electrode on substrate, on which forms the alignment layer.

Callegari et al. teach a method of preparing alignment layer, wherein the alignment layer is formed on the transparent conductive electrode, which is formed on the substrate, for driving liquid crystal molecules.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method of preparing a multi-domain as Samant et al. disclosed with the alignment layer is formed on the transparent conductive electrode, which is formed on the substrate, for driving liquid crystal molecules.

4. Claims 1 and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaudhari et al. (US6124914A) in view of Samant et al. (US6061115A).

Although these references fail to disclose a transparent conductive layer formed on a substrate, for operating a LCD they would implicitly include the alignment layer formed on the transparent conductive layer, which is formed on a substrate. Therefore, it is obvious, as a conventional prior art, the alignment layer is formed on the transparent conductive electrode, which is formed on the substrate, for driving liquid crystal molecules.

In regard to claims 4-6, Chaudhari et al. (col. 7, lines 21-42) teach a method of preparing a multi-domain; wherein the photoresist method comprises:

- depositing (implicitly) an polymer alignment layer of on electrode made of a transparent conductive layer;

- partitioning the polymer alignment layer into first domain areas and second domain areas of the polymer alignment layer;
- bombarding the polymer alignment layer with first ion beam; thereafter covering the first domain areas of the polymer alignment layer with a mask (Fig. 9B) or photoresist (Fig. A) leaving the second domain area open;
- bombarding the second domain areas with a second ion beam; and
- removing the mask.

In regard to claim 7, Chaudhari et al. (col. 6. lines 20-36, Fig. 14) teach a method of preparing a multi-domain; wherein the UV treatment method comprises:

- depositing (implicitly) an polymer alignment layer of on electrode made of a transparent conductive layer;
- partitioning the polymer alignment layer into first domain areas and second domain areas of the polymer alignment layer;
- selectively exposing one of the first and second domain areas to UV light; and
- bombarding both the first and second domain areas with an ion beam in a single direction to produce in non-UV exposed domain areas a pretilt angle different from the areas that were exposed to UV light.

However, Chaudhari et al. fail to disclose an alignment layer made of dry process materials.

Samant et al. disclose an alignment layer made of dry process materials for higher toughness due to inorganic materials.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method of preparing a multi-domain as Chaudhari et al. disclosed with an alignment layer made of dry process materials for higher toughness due to inorganic materials.

5. Claims 1, 8, 9-16 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colgan et al. (US6256080B1) in view of. Samant et al. (US6061115A).

In regard to claims 1, 8 and 26-28, Colgan et al. (Figs. 2-4) teach a method of preparing a multi-domain; wherein a ridge and fringe field method comprises:

- providing a top substrate 27 having a surface;
- providing a color filter 23 on the top substrate;
- providing a transparent conductive layer 28 disposed over the color filter, wherein a transparent conductive layer 28 is made of ITO (same as Fig. 2), which is well-known material formed the conductive transparent layer (col. 2, lines 38-40);
- building a polymer ridge 10 on the transparent conductive layer on the color filter;
- depositing an alignment layer on a surface of the transparent conductive layer and the ridge (col. 3 line 34 to col. 4, line14).

In regard to claims 9 and 29, Colgan et al. (Figs. 2-4) teach a multi-domain wide view angle LCD comprises:

- a bottom substrate25 having a first surface;

- a first transparent layer/pixel electrode 26, which is well known to be transparent in a conventional prior art.
- a top substrate 27 having a surface;
- a color filter 23 on the top substrate;
- a transparent conductive layer 28 disposed over the color filter, wherein a transparent conductive layer 28 is made of ITO (same as Fig. 2), which is well-known material formed the conductive transparent layer (col. 2, lines 38-40);
- a first dry deposited liquid crystal alignment made of polyimide (col. 3, lines 20-21);
- a second dry deposited liquid crystal alignment made of polyimide on a the second conductive transparent layer, which is spaced adjacent to and facing a first transparent conductive layer;
- a plurality of uniform sized spacer distributed within space between first and second transparent layers is conventional prior art for supporting the uniform gap to insert liquid crystal materials therebetween.

In regard to claim 13, the LCD wherein the beam ion is provided from source of Argon (Fig. 1, col. 4, lies 1-19).

However, Colgan et al. fails to disclose (a) the alignment layer made of a dry-process material according to claims 1 and 8; (b) bombarding the dry deposited layer with an ion beam under condition to produce a low pretilt angle.

Samant et al. disclose a LCD, wherein

- an alignment layer is made of dry process materials for higher toughness due to inorganic materials that are selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide, silicon dioxide, glass, silicon nitride, alumina, cerium oxide, tin oxide, zinc titanate according to claim 12;
- bombarding the dry deposited layer with an ion beam under condition to produce a low pretilt angle (col. 6, lines 43-45); wherein alignment layer is obtained by a method selected from of mechanical mask, photo-resist, UV treatment and a ridge and fringe field (col. 2, lines 10-15) for improving the view angle with different approaches to minimize number of steps with more efficient and adaptable to clean-room high throughout manufacturing according to claims 8-11;
- a first domain and a second domain have a different ion bombardment direction as shown in Fig. 2 (claim 15), and it would have been obvious to one having ordinary skill in the art at the time the invention was both of alignment layers on the bottom and top substrates bombarded for less cost using same alignment approach (claim 16)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method of preparing a multi-domain as Colgan et al. disclosed with (a) an alignment layer is made of dry process materials for higher toughness due to inorganic materials that are selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide,

silicon dioxide, glass, silicon nitride, alumina, cerium oxide, tin oxide, zinc titanate for higher toughness due to inorganic materials; (b) bombarding the dry deposited layer with an ion beam under condition for producing a low pretilt angle; wherein alignment layer is obtained by a method selected from of mechanical mask, photo-resist, UV treatment and a ridge and fringe field for improving the view angle with different approaches to minimize number of steps with more efficient and adaptable to clean-room high throughout manufacturing; (c) the first domain and the second domain have a different ion bombardment direction for aligning direction directions; (d) both of alignment layers on the bottom and top substrates bombarded for less cost using same alignment approach.

6. Claims 17-25 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colgan et al. (US6256080B1) in view of. Samant et al. (US6061115A) as applied to claim 9 above, and further in view of Chaudhari et al. (US6124914A).

In regard to claim 17, Chaudhari et al. teach the a multi-domain LCD, wherein the liquid crystal material is selected from the group consisting of a liquid crystal having left-handed chirality, having right-handed chirality, and having no chirality (col. 6, lines 2-16)

In regard to claims 18-21, Chaudhari et al. (col. 7, lines 21-42) teach a multi-domain LCD, which are obtained by the photoresist method comprising:

- depositing (implicitly) an polymer alignment layer of on electrode made of a transparent conductive layer;

- partitioning the polymer alignment layer into first domain areas and second domain areas of the polymer alignment layer;
- bombarding the polymer alignment layer with first ion beam; thereafter covering the first domain areas of the polymer alignment layer with a mask (Fig. 9B) or photoresist (Fig. A) leaving the second domain area open;
- bombarding the second domain areas with a second ion beam; and
- removing the mask.

In regard to claims 22-25, Chaudhari et al. teach a multi-domain LCD, which are obtained by the UV treatment method comprising further:

- depositing (implicitly) an polymer alignment layer of on electrode made of a transparent conductive layer;
- partitioning the polymer alignment layer into first domain areas and second domain areas of the polymer alignment layer;
- selectively exposing one of the first and second domain areas to UV light; and bombarding both the first and second domain areas with an ion beam in a single direction to produce in non-UV exposed domain areas a pretilt angle different from the areas that were exposed to UV light (col. 7, lines 21-41) according to claim 24;
- or it is obvious to reverse the process: selectively bombarding both the first and second domain areas with an ion beam in a single direction; and exposing both first and second domain areas to UV light to produce in said non-bombarded

domain areas a pretilt angle different from the area that were bombarded with ion beam (col. 6, lines 30-36).

In regard to claim 30, Chaudhari et al. (col. 6, lines 37-54) teach a method of preparing a multi-domain in-plane-switching mode LCD or TFT-LCD, wherein each of first and second layers is rubbed with a known prior art of a mechanical roll wrapped in velvet cloth wherein the improvement comprises further the step of ion beam bombardment using mechanical mask, photo-resist, UV treatment and a ridge and fringe field.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method of preparing a multi-domain as Colgan et al. disclosed with different combination of mechanical mask, photo-resist, UV treatment and a ridge and fringe field for optimizing and improving alignment

7. Claims 31 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohe et al. (US5949509A).

Ohe et al. (Figs. 1-7C) teach a wide viewing angle in-plane switching mode LCD comprising:

- a bottom polarizer;
- a bottom substrate;
- a top polarizer;
- a top substrate;
- a color filter layer disposed over a surface of the top substrate;

- a plurality of common electrodes disposed in the bottom substrate plane and a plurality of pixel electrodes disposed in a staggering relationship therewith to form a comb-like structure for producing an electric field parallel to plane of the bottom substrate so that when operated, the molecules of liquid crystal material are switched to rotate by the vertical electrical field in direction parallel to the substrate surface;
- a first dry deposited liquid-crystal alignment layer over bottom substrate and comb-like electrodes;
- a second dry deposited liquid crystal alignment layer over the color filter, the second dry deposited liquid crystal alignment layer being spaced adjacent to and facing the first dry deposited liquid crystal alignment layer;
- a liquid crystal material disposed in the space therebetween;

In regard to claim 33, the LCD wherein each of common electrodes on one end is in communication with storage capacitor and another end with TFT as Fig. 6A shown.

Although Ohe et al. fail to disclose a plurality of uniformly sized spacer distributed within the space, it is well-known prior art to distribute a plurality of uniformly sized spacer within the space for supporting the uniform gap, in which liquid crystal material disposed.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method of preparing a multi-domain as Ohe et al. disclosed with a plurality of uniformly sized spacer distributed within the space for supporting the uniform gap, in which liquid crystal material disposed.

8. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohe et al. (US5949509) as applied to claim 31 above, in view of Chaudhari et al. (US6124914).

Chaudhari et al. (Fig. 2) teach a LCD; wherein the method of obtaining each of dry deposited liquid crystal alignment layer comprises treating a dry deposited layer with an ion beam in a direction making from about 10° to 80°, which covers the range 10° to 20°, for manipulating pre-tilt angle.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method of preparing a multi-domain as Ohe et al. disclosed with each of dry deposited liquid crystal alignment layer comprises treating a dry deposited layer with an ion beam in a direction making from 10° to 20° for manipulating pre-tilt angle.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Lien et al. (US5309264A) disclose LCD having multi-domain cells.
- Albert (US4688901) discloses liquid crystal valve method and apparatus using right and left-handed twisted cholesteric liquid crystal.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOAN C. NGUYEN whose telephone number is (703)

306-0472. The examiner can normally be reached on MONDAY-THURSDAY:8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, SIKES L WILLIAM can be reached on (703) 308-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-8178 for regular communications and (703) 308-5841 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

HOAN C. NGUYEN
Examiner
Art Unit 2871

chn
March 2, 2002

William L. Sikes
Supervisory Patent Examiner
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